NON-PUBLIC?: N
ACCESSION #: 9201090151
LICENSEE EVENT REPORT (LER)

FACILITY NAME: CRYSTAL RIVER UNIT 3 (CR-3) PAGE: 1 OF 03

DOCKET NUMBER: 05000302

TITLE: Reactor Trip Caused by Feedwater Reduction Due to Nuclear Power Instrumentation Channel Being Selected for Control Which Contained a Failed Detector
EVENT DATE: 12/02/91 LER #: 91-017-00 REPORT DATE: 01/06/92

OTHER FACILITIES INVOLVED: N/A DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 050

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: W. A. Stephenson, Nuclear Safety Supervisor TELEPHONE: (904) 795-6486

COMPONENT FAILURE DESCRIPTION:
CAUSE: SYSTEM: COMPONENT: MANUFACTURER:
REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On December 2, 1991 at 2000, Crystal River Unit 3 (CR-3) was commencing a shutdown from 100 percent Rated Thermal Power (RTP) to allow trouble shooting Power Range Nuclear Instrumentation (NI) Channel NI-8, which had previously gone to zero indicated power and tripped Reactor Protection System (RPS) Channel "D". As power was reduced, a pre-existing Quadrant Power Tilt (QPT) began to increase. At 2315, QPT exceeded steady state limit of Technical Specifications and reduction of the nuclear overpower trip setpoint was required. At 0200 on December 3, power was stabilized at 50 percent RTP to allow adjustment of the nuclear overpower trip setpoint. Technicians placed Channel "A" of RPS in bypass and began reducing the overpower trip setpoint. During adjustment of the overpower trip setpoint, an erroneous reactor power signal was sent to the Integrated Control System (ICS), due to NI-8 indicating zero, resulting

in feedwater flow decrease to the steam generators and control rod withdrawal. The reactor tripped on high pressure in approximately 30 seconds. Several factors contributed to this event including incorrect operator training on the NI power averager/auctioneer circuit, and lack of cautions in the procedure regarding setpoint adjustment with a failed NI. Plant procedures are being revised to provide cautions and operators will receive training on operation of the averager/auctioneer.

END OF ABSTRACT

EVENT DESCRIPTION

On November 30, 1991, Crystal River Unit 3 (CR-3) was operating at 100 percent Rated Thermal Power (RTP). At 1110, Power Range Nuclear Instrumentation (NI) IG, DET! Channel NI-8 went to zero indicated power, tripping Reactor Protection System (RPS) Channel "D" JC!. Technical Specification (TS) 3.3.1.1 allows power operation to continue with one power range NI inoperable provided the associated RPS channel is maintained in the tripped condition.

CR-3 continued to operate at 100 percent RTP until December 2 at 2000, when a shutdown to allow troubleshooting of NI-8 was started. As power was reduced, a pre-existing Quadrant Power Tilt (QPT) began to increase. This was not unexpected due to the QPT seen during reactor startup several days earlier. At 2315, QPT exceeded the steady state limit of TS 3.2.4. The action statement of this TS requires reduction of the nuclear overpower trip setpoint within four hours. At 0200 on December 3, power was stabilized at 50 percent RTP to allow reduction of the nuclear overpower trip setpoint. Instrumentation and Control (I&C) technicians placed Channel "A" of RPS in bypass and began the process of reducing the overpower trip setpoint. When the power range test module was placed in the "Test/Operate" position, an erroneous reactor power signal was sent to the Integrated Control System (ICS) causing a decrease in feedwater SJ! flow to the steam generators SB, SG! and control rod AA! withdrawal. This caused RCS pressure to increase. The operators manually opened the pressurizer spray valve AB, FCV! to compensate for the effects causing Reactor Coolant System (RCS) AB! pressure increase; however, this was not enough to prevent a reactor trip due to high RCS pressure, which occurred in approximately 30 seconds. During these events, the function of the RPS was maintained and all equipment functioned as designed. This event is being reported due to a RPS actuation per 10CFR50.73(a)(2)(iv).

CAUSE

The Integrated Control System (ICS) is fed a reactor power signal from the four Power Range Nuclear Instruments (NIs). The signals from NI-5 and NI-6 are averaged as are the signals from NI-7 and NI-8. The higher of the two averages is then selected by a high auctioneer and fed to the ICS as reactor power. When a channel is placed in test, the output from that averager is grounded (0 percent power signal). The high auctioneer would then elect the output from the other averager which would indicate a greater than zero power level. NI-5 and NI-6 were both indicating approximately 50 percent power. The average was, therefore, approximately 50 percent. NI-7 was indicating approximately 50 percent power but when averaged with the failed NI-8, indicating 0 percent power, the average of these two channels was now 25 percent. When the "A" RPS Power Range Test Module was placed in "Test/Operate", the output from that averager was grounded. The auctioneer took the output from the average of NI-7 and NI-8 and sent this to the ICS for control. In this configuration, the ICS saw the reactor power signal drop from 50 percent to 25 percent and reacted appropriately (ICS withdrew control

rods to match indicated power to demand and reduced main feedwater flow to match indicated reactor power).

Several factors contributed to placing the switch in "Test/Operate" without first taking actions to prevent sending the erroneous power signal to the ICS. First, the operators had been trained that a channel in test causes the averager to pass only the signal (as the average) that is coming from the channel not in test. This is incorrect. The instrument technicians had been correctly trained in the operation of the averager circuit. However, discussions in the control room prior to the event did not reveal the differences in the understanding of the operation of the averager circuit. Second, the procedure used to reset the high flux trip setpoint did not contain cautions related to resetting with one NI indicating incorrect power level.

EVENT EVALUATION

This event resulted in a reactor trip on high RCS pressure. The RPS setpoints were reached and the system functioned as designed, tripping the reactor. There was no threat to the health and safety of the general public from this event. There was no release of radioactive material. All safety systems functioned as designed.

CORRECTIVE ACTION

Plant procedures are being revised to warn the operators about possible ICS response to operation of the averager/auctioneer test circuits with failed inputs. The Nuclear Training Department is revising their lesson plan and will perform operator training on this subject.

PREVIOUS SIMILAR EVENTS

There were no previous similar events found where a misunderstanding of the NI control logic caused a reactor trip.

ATTACHMENT 1 TO 9201090151 PAGE 1 OF 1

Florida
Power
CORPORATION
Crystal River Unit 3
Docket No. 50-302

January 6, 1992
3F0192-05

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D. C. 20555

Subject: Licensee Event Report (LER) 91-017

Dear Sir:

Enclosed is Lic
nsee Event Report (LER) 91-017. The delay in LER transmittal from the required due date was the result of additional time needed for proper review by management personnel.

Sincerely,

G. L. Boldt
Vice President
Nuclear Production

WLR:mag

Enclosure

xc: Regional Administrator, Region II
Project Manager, NRR

Senior Resident Inspector

A Florida Progress Company

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